

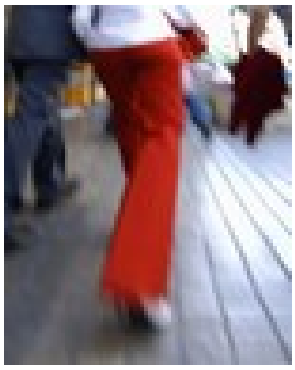

Report of the Task Force on Traffic Calming & Pedestrian-Friendliness

Sheila Dixon, Mayor

JULY 2007

Traffic Calming & Pedestrian-Friendliness Task Force Members

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The Task Force wishes to acknowledge the work of Mr. Ziad Sabra, Principal, Sabra, Wang, & Associates, for his guidance through the Task Force process.

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TRAFFIC CALMING
TASK FORCE COMMITTEE FINDINGS

- ✓ Based on the research, interviews and several panel discussions the Task Force offers the following findings:

- ✓ The streets of Baltimore ought to be for everyone, be it motorist, bicyclist, pedestrian, wheelchair user jogger, bus rider or shopkeeper.

- ✓ Two primary concerns of residents seeking traffic calming solutions are reduction in traffic speed and cut through traffic.

- ✓ The Department of Transportation has largely been in a mode of responding to traffic calming requests, which are overwhelming in number relative to the resources that DOT has to investigate safety concerns and implement traffic calming solutions.

- ✓ Too often, solving one speed or safety concern yields a similar concern on an adjacent street. Traffic calming is best achieved in a systematic approach rather than a single point solution.

- ✓ Speeding on high volume, major roadways ("arterials") requires an enforcement-based approach to traffic calming. The Baltimore City Police Department, even with support from State police agencies, does not have sufficient resources to enforce the City's traffic laws.

- ✓ Speed enforcement is the most effective means to calm traffic on arterial roadways. Speed Cameras are a cost effective means to apply speed enforcement.

- ✓ Ingress and egress of police, buses and emergency vehicles are important considerations when considering traffic calming measures.

- ✓ The implementation of traffic calming measures requires careful consideration by both the Department of Transportation and affected communities. A defined, transparent process for handling traffic

calming requests and prompt follow-up by DOT should produce greater citizen satisfaction.

- ✓ The Department of Transportation is responsible for managing the road network in a safe manner, which includes the implementation or traffic calming. While community consideration and consultation on traffic calming matters is important, the Department can not yield its legal authority and responsibility for managing the public right-of-way. DOT has the ultimate authority when deciding on the proper course of action with regard to every traffic calming request.

- ✓ The Department of Transportation should review their current standard road cross sections to determine the possibility of updating the standards to better accommodate bicyclists and pedestrians

TRAFFIC CALMING
TASK FORCE RECOMMENDATIONS

Establish a more thorough and transparent process for evaluating requests for traffic calming. The Task Force has developed a subjective set of guidelines and point assignment system which considers road function/classification, safety, speed, pedestrian activity, presence of sidewalks, community support, etc. DOT is prepared to begin using these guidelines as the basis for evaluating traffic calming requests. DOT's community outreach team will assist communities in understanding these guidelines.

Although unanimous support for traffic calming is not expected from all residents, the Task Force recommends that a request from a community association ought to be a prerequisite to initiate a traffic calming study. Where a community is not represented by a formal community association, residents should be able to submit a request for a traffic calming study in accordance with the Traffic Calming Guidelines. The Department of Planning's Community Association Directory should serve as a reference to the DOT for identifying community associations.

In addition to providing a printed version of traffic calming materials to the public, DOT should place traffic calming request forms, a traffic calming brochure, and a traffic calming "tool box" on the City's website. DOT should publish in the Traffic Calming Brochure the process to request a traffic calming study, the steps DOT will take to conduct a study, and the follow-up actions DOT will consider.

The Task Force recommends that a request for a traffic calming study should not be limited to local streets only; traffic calming on arterials should be considered as well but with a different means of traffic calming strategies. To this end, DOT should assess, identify and publish the functional classification of the streets on a periodic basis. When a traffic calming request is made, DOT should make a determination on the street classification and follow the study procedures accordingly.

The Task Force recommends the following process for traffic calming studies:

Acknowledge the request for a traffic calming study by contacting the community association in writing; if the request for a traffic study is made by an individual, DOT should refer the individual to the appropriate community association.

Initiate a field investigation of the referenced streets as well as neighboring streets in order to gain a good understanding of the neighborhood. DOT will define the limits of problem areas; initiate a traffic calming study, and collect field information and safety data.

Complete data analysis and proposed plan of action within 60 days. Subsequently, DOT should contact the community association and offer to present the findings of the study and discuss an action plan.

Depending on the proposed action, approval to move forward with installation of traffic calming measures should be petitioned by the community. If a consensus is not reached, DOT should use its discretion to decide an action plan.

The steps above should be tracked via the Department's CitiStat template to ensure accountability of the timelines described above.

The actual implementation and timeline for traffic calming measures will depend on availability of funds and prioritization of the action steps relative to other safety concerns and traffic calming measures proposed throughout the City. It is very possible that traffic calming measures, although approved, may not physically be installed until the next fiscal year.

Expand the "traffic calming tool-box."

There are dozens of mechanisms for controlling speed, from enforcement to signage to physical construction of horizontal and vertical devices. DOT uses few of these tools and generally responds to requests with "speed bumps." Typically, it is only under heavy community pressure that alternative measures of traffic calming are considered. The Task Force recommends that the City should use the *tool-box* identified in the Traffic Calming Guidelines as a staring point, and then reevaluate the effectiveness of the *tool-box* measures based on lessons learned. The Task Force recommends that applications of traffic calming in the City of Baltimore should not be limited and/or constrained by the measures listed in the *tool-box.* Innovative ideas should be encouraged, especially for pedestrians and bicyclists.

Traffic Calming on Interior Neighborhood Streets

The Task Force has agreed on a "tool box" of traffic calming measures to address speeding, pedestrian safety and cut through traffic in residential neighborhoods. DOT should assess the effectiveness of the various measures based on prevalent safety problems and past experience with traffic calming measures in the City and in similar communities. The Task Force recommends uniformity and consistency in the evaluation and selection of traffic calming treatments. It is expected that as a result of this program, and the experience DOT will gain in the next few years, the traffic calming *"tool box"* will be expanded and customized to meet the uniqueness of streets and communities in the City of Baltimore.

Traffic Calming on Arterial Roadways

Traffic calming on arterials should not be ruled out, but the selection criteria should be different from the criteria used for interior residential streets. The proposed guidelines offer criteria and alternatives for traffic calming on arterial roadways.

Traffic Calming and New Development Projects

Traffic calming should be a requirement of the scope of services for Traffic Impact Studies and traffic calming measures should be considered as a tool for mitigating the adverse traffic impacts of new development.

Important Considerations in Selecting Traffic Calming Devices

The Task Force recommends that ingress and egress of police, buses and emergency vehicles should always be considered when selecting traffic calming devices for a particular section of roadway.

Establish funding sources for traffic calming.

The challenge in funding traffic calming improvements on a citywide basis should be as equitable as possible with the disbursement of monies. To maximize funding opportunities; however, the Task Force recommends that the Department consider a number of alternatives for funding traffic calming action plans, such as:

Funding traffic calming studies and deployments by pooling a small amount of funds from various accounts in the Capital Improvement Program (CIP). Specific capital funding sources that that could be pooled include earmarking a small percentage of roadway resurfacing, rehabilitation, and streetscape budgets.

Establishing a traffic calming fund based on developer mitigation of adverse traffic impacts, as contemplated in Ordinance 06-345.

Allowing neighborhoods to contribute all or a portion of the cost of installing traffic calming measures. Private funding could be collected in several different ways, including fund-raising events, creation of local improvement districts, or a direct levy on property tax assessments (similar to the manner in which payments for alley and sidewalk improvements are levied for.)

Using the proceeds from an Automated Speed Enforcement Program to fund traffic safety and traffic calming programs.

Take a proactive, neighborhood-wide approach to traffic calming.

Too often, the implementation of a traffic calming device has the effect of moving traffic (and speed) to an adjacent roadway. The Task Force recommends that DOT begin a pilot program to evaluate a neighborhood-wide approach to traffic calming, using the many different tools in the traffic calming tool-box.

The successful approach to a neighborhood traffic calming program will be to encourage all non-local traffic within a neighborhood to use higher classification streets, and make those who live on and travel residential streets more aware of community needs for safer, livable and environmentally-friendly neighborhoods. Defining the limits of a traffic calming study is a critical first step in implementing a comprehensive solution. The study area may be correlated with the distinct boundaries of a neighborhood, such as major arterials, parks, or natural topographic features such as streams, or may be limited to all parallel facilities within an affected area. A more in-depth analysis of impacted streets should be performed by the City, with input from community stakeholders. Plan and field review of the study area should be performed to verify that the limit of study encompasses all affected streets.

The Task Force recommends that the study should consider adjacent streets on both sides of the affected streets to make sure that solving a problem on one street doesn't create two new problems on the parallel streets. Furthermore, the Task Force recommends that the traffic calming should be achieved systematically rather than a single point solution.

The emphasis of this approach shall be to evaluate on both a macro and micro-level traffic patterns and circulation. The initial investigation may focus on one or several streets that have generated a particular complaint about traffic volumes and/ or speed. However, the redundancy of an urban grid network provides for multiple alternative routes, some of which will provide direct connections and may be attractive for diverted traffic volumes, while others may not due to one-way flows, congestion, signals, etc. The determination of a traffic calming study area should be performed on a case-by-case basis with sound engineering judgment.

As part of a pilot study, it is suggested that an expanded study area be developed. The expanded area should be extensively evaluated before and after the implementation of traffic calming measures to identify changes in volumes and non-local traffic using traffic counts and license plate surveys.

Enact an Ordinance prohibiting the construction of vertical and horizontal deflections as means to reduce speeds or divert traffic on major arterials.

Arterial roadways are designed to move high volume traffic on multi-lane roadways at reasonable speeds, usually at or higher than 35 miles per hour. A typical example of arterials in the City of Baltimore include Pratt and Lombard Streets in the downtown neighborhoods, and Boston Street and Edmondson Avenue in the east and west neighborhoods, respectively. These streets must be allowed to serve the function for which they were designed. Several other cities, including Atlanta and Chicago, have adopted similar ordinances as part of an overall traffic calming program.

Any change in the roadway surface such as placing a vertical deflection (e.g. speed hump), or a horizontal deflection such as abrupt change in the alignment to slow down traffic on arterials, could result in unsafe conditions to all users of the streets. Furthermore, a sudden change in speed on high-volume arterials could cause rear-end collisions and secondary crashes. Other means to slow down traffic on arterials are available but focus on law enforcement and driver awareness rather than on changes in the roadway physical characteristics. Because of the current limited law enforcement resources available to the City of Baltimore, the Task Force recommends that alternate means of law enforcement, such as automated speed enforcement cameras, be implemented on arterials that experience significant speeding problems.

Seek passage of State legislation enabling the use of automated speed enforcement systems in Baltimore City.

As a starting point, the Task Force recommends placing speed cameras near schools, recreation centers, parks, and churches. The Task Force further recommends that an automatic speed enforcement system should be operated by the Police. Violations and waivers of fines should be reviewed and acknowledged exclusively by the Police.

The automated speed enforcement concept is similar to the current "Red Light Camera" concept currently implemented in the City of Baltimore, except it is usually deployed first in unmarked vehicles to leverage its effectiveness. They can be installed on fixed locations as well. This technology is not experimental; it has been in operations for many years and is currently deployed in the District of Columbia and Montgomery County.

Automated speed enforcement can be implemented at no cost to the City in a manner similar to the Red Light Camera Program. The Task Force recommends that proceeds from fines should be used to maintain and fund the traffic calming program for the City of Baltimore. The Task Force recommends that the capital and all maintenance costs required to operate and maintain the system should be expended by the system provider as a fixed contractual amount. The system provider should not be paid on a percentage of the fines levied.

Summary of Traffic Calming Guidelines Recommended by Traffic Calming Task Force

Process	Current	Proposed
How are requests made?	Request for speed bumps initiated by resident, community association, elected official, etc. in any form (email, 311, letter, etc.)	Request for traffic calming to be made on standard form and must be supported either by the community association or an elected official, if no community association present.
Study area	Typically, study conducted on the street segment where requested	DOT to define study area based on parallel streets and logical street segments.
Study criteria	85% of vehicles must be traveling at 10 mph or greater to qualify for speed bumps.	Sliding point scales for: • Traffic volume relative to design (up to 20 points) • 85th percentile speed (up to 35 points) • Pedestrian and vehicle accidents (up to 20 points) • Presence of school, playground and/or other pedestrian generators (shops, libraries, parks) (up to 20 points) • Presence or absence of sidewalk (up to 10 points) • Sight Distance (up to 5 points)
Study period	Study conducted and device installed within 180 days.	Study conducted within 45 days and meet with community within 30 days thereafter. Regular monitoring to occur via CitiStat template.
Concurrence on measure/ location	70% signatures required for approval	DOT to present findings to requesting community association and begin formal approval process; 70% signatures still required
Design/Implementation	Typically handled by Traffic/ Maintenance divisions; scheduling is as resources are available	Design will continue to be handled by Traffic Division; on-call contractors will supplement Maintenance Division installation of traffic calming devices.
Traffic Calming Devices Used	Speed bumps are most common device; only extreme circumstances yield additional/ alternative tools.	A much broader tool-box will be used to emphasize traffic calming on neighborhood streets; enforcement approaches recommended for major roads.
Funding	Handled from current resources	$200,000 added to CIP for FY 08 for Neighborhood Traffic Calming.
Monitoring and evaluation	No formal process	Devices will be installed on a 6-12 month evaluation and tested relative to the reason for installation. DOT will consider alternative solutions if goal is not met.

Baltimore City DOT
Traffic Calming Guidelines

Effective August 1, 2007

Alfred H. Foxx, Director

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INTRODUCTION

This document provides policies and guidelines for requesting traffic calming studies, and to select traffic calming measures based on the magnitude of the problem. The report discusses the process, starting with a request to perform a traffic calming study and concluding with monitoring and evaluation of traffic calming treatments that may be justified and installed. The policies and guidelines described in this document address local residential streets, minor arterials, and collector roads.

Traffic calming is a traffic management strategy that involves the combination of physical changes in roadways and traffic control measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized road users. In most neighborhoods, residents are concerned about safety as well as the quality of life. Both are impacted by vehicle noise, speeding, cut-through traffic and exhaust emissions.

The City of Baltimore is committed to a balanced transportation strategy that ensures the overall safety and livability of residential neighborhoods, while making sure that people and goods can move quickly to and through the City. The City of Baltimore *Traffic Calming Policies and Guidelines* provide a structured process for involving the community in implementing solutions for residential traffic problems that can be mitigated by traffic calming measures. The following policies and guidelines form the basis of the process citizens can use in the City of Baltimore to initiate traffic calming investigations.

Any questions or requests regarding this program should be directed to Ms. Felicia Oliver, Chief, DOT Traffic Division, at 417 E. Fayette Street, Baltimore, Maryland 21201, or to the DOT neighborhood liaison for your area of the City.

DEFINITIONS

Traffic Calming – Denotes methods used to reduce vehicular speed and volume, while sharing streets with pedestrians, bicyclists and other users. Generally, traffic calming refers to physical measures, roadway design changes, enforcement and education.

Arterials – Roadways that facilitate high volume vehicular traffic between collector streets and freeways. Traffic is supposed to move on a sequence through the hierarchy of streets: residential to collector to arterial to freeways. An example of these characteristics would be York Road being the arterial, collecting residential vehicular traffic through collector roads such as Woodbourne Avenue and Lake Avenue and then destined northerly to I-695. Arterials may have homes and businesses fronting on one or both sides, but traffic volumes are usually greater

than 3,000 vehicles per day.

Residential Streets – Low volume, low speed roads (30 mph or less) in local neighborhoods, with traffic volumes less than 2,500 vehicles per hour.

Collector Streets – The intermediary streets that funnel vehicular traffic from residential streets to arterials.

Cut-through traffic – Through traffic diverted from arterial and collector streets onto local residential streets to avoid congestion and/or longer trips.

DOT – City of Baltimore, Department of Transportation

TED - Traffic Division, Department of Transportation

CA - Community Association

Median – A refuge island in the center of a street or intersection to protect pedestrians and provide landscaping features. Medians prevent passing and left turns, separate opposing travel lanes and provide visual enhancement.

Signage – Denotes roadway signs

Speed Study – A study to measure, collect and statistically analyze the speeds of vehicles as they approach a specific reference point on the street.

vpd – Vehicles per day

mph – Miles per hour

Study Area – The boundary of the problem area, which may cross traditional neighborhood boundaries. In most cases, however, a study area may encompass one parallel street on each side of the street in question, in order to assess the potential impacts of traffic diversion on adjacent streets.

Level-of-Service – A qualitative measure describing operational conditions within a traffic stream, generally in terms of factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Level of service designation ranges from A to F as shown in the table below:

Level of Service	General Operating Conditions
A	Free flow
B	Reasonable free flow
C	Stable flow
D	Approaching unstable flow
E	Unstable flow
F	Breakdown flow

Note: Specific definitions of levels of service A through F vary by road type. (See Appendix C for level of service illustrations).

Vertical Deflection – Any abrupt change in elevation in the road surface elevation; typically referred to speed humps and speed bumps.

Horizontal Deflection – Any abrupt change in the alignment of the road, caused purposely to slow down traffic.

Traffic Calming Measure – An element of a traffic calming plan selected to reduce speeds and/or cut-through traffic.

Median Island (Slow Points) – Center-located barriers dividing opposing roadway travel lanes at either intersections or midblock.

Traffic Calming Study – An appraisal of traffic conditions and the development of a plan for implementing one or more traffic calming measures.

Warrants – The minimum criteria necessary to require a change in the type of control, such as installation of a stop sign or a traffic calming device. These criteria are outlined in both federal and local engineering manuals and standards. Typically warrants are justified based on speed surveys, traffic volume studies and accident records.

85th Percentile Speed – The speed at which 85% of the vehicles are moving at or below. The measured 85th-percentile speed indicates that only 15% of drivers exceed it. Typically, in addition to using the roadway functional classification, the 85th percentile speed is also used to determine the speed limits of roads.

OBJECTIVES

The overall objectives of the *City of Baltimore Traffic Calming Policies and Guidelines* are to maintain the safe and efficient movements of persons while ensuring the livability and environmental quality of our neighborhoods. A by-

product of these objectives is to: involve residents and stakeholders (community associations, police, fire & emergency services, etc.) in the decision-making processes in all phases of traffic calming activities; strive to meet the overall goals, objectives and policies administered by DOT; and promote conditions that provide safe neighborhoods for motorists, bicyclists, pedestrians and residents while maintaining access and services to the neighborhood.

POLICIES

The following policies are established as part of the *City of Baltimore Traffic Calming Policies and Guidelines*:

- Traffic calming studies desired in commercial areas or public places may be requested by neighborhood associations, business associations and/or elected officials.

- In areas where speeding exceeds the posted speed limit by more than 10 mph, traffic calming measures should result in the reduction of speeds.
- Ingress and egress of police and emergency vehicles must not be compromised. The police and fire departments shall be the primary decision maker regarding restrictions to ingress and egress.

- The design of traffic calming measures should reflect the requirements of pedestrians and bicyclists.

- Traffic calming studies may be requested when cut-through traffic is significant; at least 25-percent increase in the local traffic volumes.

- Traffic calming measures should not result in a significant reduction of the capacity of intersections and roadways where they are placed.

- Traffic calming solutions for identified problems should be cost-effective and not over-designed.

- Traffic calming measures shall conform to engineering and procedural standards established by BCDOT, including consideration of ongoing maintenance of roads (i.e. snow removal, resurfacing, etc.)

- BCDOT shall be responsible for conducting traffic calming studies and making recommendations for implementation.

- A traffic calming study shall be the basis for deciding the appropriate measure(s) for a situation.

- BCDOT may consider the deployment of a traffic calming measure on a trial

basis. All such deployments should be evaluated for effectiveness within twelve (12) months of installation.

- The final location of traffic calming installations (and whether they will be installed at all) shall be determined by BCDOT.

GUIDELINES

The Department of Transportation, Traffic Engineering Division (DOT TED) shall recommend traffic calming measure(s) based on a traffic calming study that will consider the guidelines (or criteria) outlined below. A traffic calming study consists of field observations, collecting traffic volumes and speeds, and analyses of safety data for the past 3 years. DOT TED shall review and approve the traffic calming recommendations provided in the study. General guidelines include the following:

- Because the installation of a traffic calming device on one street may have potentially adverse affects on an adjacent street, it is DOT's preference to conduct neighborhood-wide traffic calming studies rather than spot studies. DOT officials shall define the study area based on the traffic calming application submitted, in collaboration with the relevant community association.

- Traffic calming measures implemented at intersections and on roadways shall not result in lowering the overall peak hour level of service below "D".

- Physical traffic calming measures (such as speed humps) should generally not be considered on:
  - Emergency and evacuation routes
  - Roadways with grades of 7% or more
  - Arterials or collector streets
  - Through truck routes

- A problem area is defined as the subject street and one parallel street on each side of it.
  1). DOT TED shall conduct a traffic calming study if: a request is supported by the area's Community Association, or
  2). An elected official representing the problem area makes a request.

- The implementation of any traffic calming measure should have the support of at least 70% of the residents within the study area with the concurrence of the area's Community Association. BCDOT reserves the right to install a traffic calming measure without community support, if it is determined that such a measure is the interest of public safety.

- Traffic calming measures will be considered when the average daily traffic

(ADT) exceeds 300 vehicles per day (vpd) but less than 3,000 vehicles per day. Traffic calming on roads with higher volumes shall be considered on a case-by-case basis and may fall under the "Guidelines for Arterials and Collector Streets".

- When the 85th percentile speed on a street segment exceeds the posted speed limit by at least 10 mph, traffic calming measures should be considered. Excessive cut-through volumes on local neighborhood streets can trigger traffic calming measures.

- Traffic calming measures shall have no significant adverse impact on fire, police and ambulance services.

- Traffic calming measures could be justified if DOT determines that cut-through traffic volumes are significant.

- Crash (accident) data for the most recent three years should be analyzed by type, severity, location, roadway condition, and time of crash. Crash rates should be considered significant when there are 3 or more reported cases involving pedestrian, bicycle or automobiles along a local residential street within a one year period.

- In cases where parking may have to be removed, the effect(s) on other parking facilities within the neighborhood as well as alterations to traffic patterns should be analyzed.

TRAFFIC CALMING FOR ARTERIALS

Arterials and collector streets shall be considered for traffic calming measures under a different criterion than from those considered for local residential streets. Under those circumstances, the application of standard traffic control devices, automated speed camera enforcement, use of synchronized traffic signals, and the use of other Intelligent Transportation Systems (ITS) should be encouraged. Arterials in the City of Baltimore serve major functions in the Central Business District; intercept urban boundaries; carry large volumes of traffic regardless of posted speed limits; interconnect communities and major traffic generators; provide access to abutting properties fronting on one or both sides of the road; and serve emergency routes. Therefore, traffic calming on high volume roads should be carefully considered and traffic calming measures should not compromise the capacity of those streets to serve high volumes of traffic at prevailing speeds.

Traffic calming measures that will be considered for arterials and collectors include, but are not limited to: speed sentries, automated speed enforcement, streetscape (medians, vegetation, etc.), sidewalks, forced signal stops/controlled progression, positive guidance signing and pavement markings. Speed and

volume mitigation measures less likely to be considered include, but are not limited to: vertical and horizontal deflections, median closure and restriction of access at at-grade intersections.

TRAFFIC CALMING MEASURES FOR NEIGHBORHOOD STREETS

The following physical traffic calming measures, defined below, may be installed in residential neighborhoods in the City of Baltimore. Some of these measures are shown in the figures presented in Appendix B. Other measures including turn prohibitions, striping, addition of bicycle lanes, etc., may be considered in addition to those listed below.

Bulb-out – An extension of a curb in the form of a bulb, usually at an intersection, that narrows the vehicular pathway and inhibits fast turns; also called ***Curb Extension*** or ***Neckdowns***.

Chicane – A series of fixed objects, usually extensions of the curb, which alter a straight roadway into a zigzag or serpentine path to slow vehicles.

Choker –A narrowing of the fixed street, often in mid-block and sometimes near an intersection. May be done with curb extensions, landscaping or islands in the street.

Circle – A small circular island, usually less than 26 feet in diameter, used in the middle of intersections and intended to force vehicular traffic to slow and negotiate around it. When used in residential areas, they can be landscaped for aesthetic or barrier purposes, and may have mountable curbs to facilitate movement of emergency vehicles.

Cul–de-Sacs/Full Street Closures - Full street closures are barriers placed across an entire width of street to completely close the street to through- traffic, usually leaving only sidewalks open. They are also referred to as cul-de-sacs or dead ends.

Diagonal Diverter – A partition that connects two diagonally opposite curbs, bisecting the intersection, to force motor vehicles to slow down and turn. A *traversable barrier* allows emergency vehicles, as well as bicyclists and pedestrians, to cross over.

Forced Turns – These are islands used on approaches to an intersection that force drivers to turn in only one direction (usually right).

Half Closures - These are barriers that block travel in one direction for a short distance on an otherwise two-way street; also called ***semi-diverters.***

Median Barriers - These are narrow islands constructed between travel lanes through an intersection. They are intended to prevent left turns from the major street and through movements along the minor street.

Raised Crosswalk – A traditional pedestrian crossing area purposely raised above the normal pavement surface level in order to give motorist and pedestrians a better view of the crossing area.

Rumble Strips – Pavement surface treatments intended to cause drivers to experience vehicular vibrations signaling the drivers to slow down.

Speed Humps – Vertical obstructions installed on the pavement surface, across the traveled lanes, and intended to cause vehicles to slow. Speed humps are usually 12 to 22 feet long and up to 4 inches high. They utilize parabolic vertical radii that result in gentle crossing by vehicles.

Speed Sentry/Flashing Signs – Portable or permanent signs that show the speeds of approaching vehicles. Speeds exceeding the speed limits are usually depicted in a flashing mode.

Speed Tables – Wide mountable obstructions installed on the pavement surface across the travel lanes, and intended to cause vehicles to slow. They are similar to speed humps, except for the flat-topped section located between the approach and far edges. Speed tables are generally wider than speed humps and are gentler on vehicles.

The cost of traffic calming treatments ranges from $2,000 to $50,000 depending on the devices used, street width and other environmental characteristics of a street. However, the approximate costs are as follows: $3,000 for portable speed sentries, $2,500 for a speed hump and $20,000 for concrete design treatments for chicanes, lane narrowing, median islands, chokers, speed tables, etc.

The effectiveness of some of the traffic calming measures, mentioned in this document, in addressing problems involving volume, speed, traffic conflicts and emergency services are summarized in Table 1. These summaries are based on numerous studies and experience with other agencies across the country.

Table 1. Effectiveness of Typical Traffic Calming Measures

Traffic Calming Measures and Traffic Control Devices	Volume Reduction	Speed Reduction	Conflict Reduction	Emergency Response
Speed Bump	M	S	M	S
Speed Hump	M	S	M	S
Speed table	N	M	N	M
Circle	M	M	S	S
Chicane	M	M	N	M
Raised Intersection	N	M	M	S
Neckdowns	N	M	M	N
Chokers	N	M	M	M
Textured Pavement	N	N	N	N
Rumble Strip	N	M	N	M
Gateway	N	N	N	N
Pedestrian Refuge	N	M	M	N
Median barrier	S	N	M	S
Street Closure	S	M	S	S
Diagonal Diverter	S	M	M	M
Forced-turn Island	M	N	M	M
Speed Limit Signing	N	M	N	N
Multi-way Stop Control	N	M	M	M
Turn Prohibitions	M	N	M	N
One-Way Streets	S	N	M	M

Legend: **S**- Denotes Significant Effect; **M**- Denotes Moderate Effect **N**- Denotes Minimal or No Effect

TRAFFIC CALMING PROCESS

The process followed for requesting traffic calming studies and follow up activities are summarized in Figures 1 and 2 for local neighborhood streets as well as collectors and minor arterials, respectively.

(a) Request Procedure

Requests for a traffic calming study must be initiated through residents via their Community Association and with the support of the constituents where the problem is identified. The traffic calming influence area, in general, is defined as the street being addressed and one parallel street on each side of it. A formal request should be submitted using the Form attached on page A-1. DOT will acknowledge the request, and within a reasonable time frame after the submittal of a complete application, DOT and the Community Association may organize a neighborhood meeting where traffic problems, issues and candidate solutions should be discussed. DOT shall address possible solutions to traffic problem(s) and offer residents the opportunity to provide their input on the traffic calming study, scope of work and proposed study area.

All requests shall be in the form of a formal application submitted on the "Request for Traffic Calming Study" Form, obtainable from DOT by calling (410) 396-6905, or available on-line at **www.Baltimorecity.gov**. Completed Traffic Calming request applications should be sent to:

Ms. Felicia Oliver, Chief
Traffic Division
City of Baltimore
Department of Transportation
417 E. Fayette Street
Baltimore, MD 21201

(b) Traffic Calming Study

A traffic engineering study shall be conducted by DOT or a consultant appointed by DOT. This shall involve study area determination and data collection and analyses. A report summarizing findings on the following parameters should generally be submitted to DOT for review, within a 60-day period after a study has started. A study may include a combination of the following:

- Vehicular volume
- Speeds
- Cut through traffic
- Crashes
- Road alignment and grade
- Street or segment classification
- School and bus stops and routes
- Parking
- Pedestrian activities
- Bicyclist activities
- Other physical conditions on roadway or segment.

The report should also contain findings and recommendations, if applicable, on traffic calming solutions.

(c) Concurrence on Measure and Location

Generally, DOT will notify the Community Association and offer to present the findings of the traffic study at a community meeting. The recommendations could include other possible solution(s) which were not requested but may be warranted based on the factors surrounding each case. Residents will be given the opportunity to discuss their views during the meeting. DOT and the residents should then work towards a consensus on the most appropriate traffic calming measure(s) and specific location(s) based on the recommendations from the traffic

calming study. The deliberation must be concluded with a petition prepared by the Community Association. DOT will provide the petition form.

However, if a consensus is not reached, DOT will use its discretion in deciding whether or not to proceed with implementation based on the traffic calming study's recommendations and community comments.

(d) Approval Process

The legitimacy of a traffic calming measure is determined by the needs expressed by the community and validated by a traffic engineering study. However, all qualified projects must fit into the annual operating budget or six-year capital improvement budget of the DOT. Thus, legitimacy does not guarantee installation in a time period envisioned by citizens. DOT may approve a recommended traffic calming measure or solution based on budget and cost considerations. As the capital improvement budget for any year is based on projects identified in previous years, funding for implementing approved traffic calming measures may have to be appropriated in the budget in the following fiscal year. In addition, traffic calming projects shall fit into the priority schemes for the capital improvement budget. Thus, funding availability and timing are critical in the implementation of a traffic calming measure. DOT will assess the chance of implementation during a specific fiscal year and notify the Community Association accordingly. Where possible, BCDOT should make the effort to include traffic calming among the priority projects.

(e) Design and Implementation

When a traffic calming measure is programmed into the capital budget, DOT shall schedule and proceed with the design and implementation. The designs would follow all nationally recognized standards (e.g. MUTCD, HCM, ITE, AASHTO guidelines, etc.), and other traffic engineering standards for the City of Baltimore. Some measures may be installed on a temporary basis for a particular "test period". These temporary measures should be considered if traffic flow may be severely reduced by the installation of permanent measures. Following the temporary installation period, the Community Association and DOT must decide whether to install the measure on a permanent basis. This decision should be made after the measure has been monitored and evaluated regarding its effectiveness in solving the problem.

(f) Monitoring and Evaluation

The "test period" for monitoring and evaluating traffic calming measures should usually be between 6-12 months; although in some cases a longer duration may be required. This period may be extended into the snow season in order to provide the opportunity to detect any snow removal (or snow related) problems that may exist due to the installation of the measure. During this period, DOT shall evaluate

residents' and motorists' reactions, conduct field observations, perform traffic counts, speed studies, and collect and analyze other data as needed. The analysis of the data collected should determine whether the measure or solution has met its desired objective. If the traffic calming measure does not meet the desired or intended objective based on the analyses or other factors, DOT should notify the Community Association about its removal. Alternative solutions may be considered. After there is consensus on the desirability of financially feasible traffic calming measures, the temporary installation will be removed and the permanent measures will be installed. After installation, monitoring and evaluation of a traffic calming measure, a follow-up traffic study may be conducted. The study may help in the decision-making process on similar measures to be deployed in other areas of the City. Follow-up studies may also help explain the reasons why some residents or motorists may resist a particular measure.

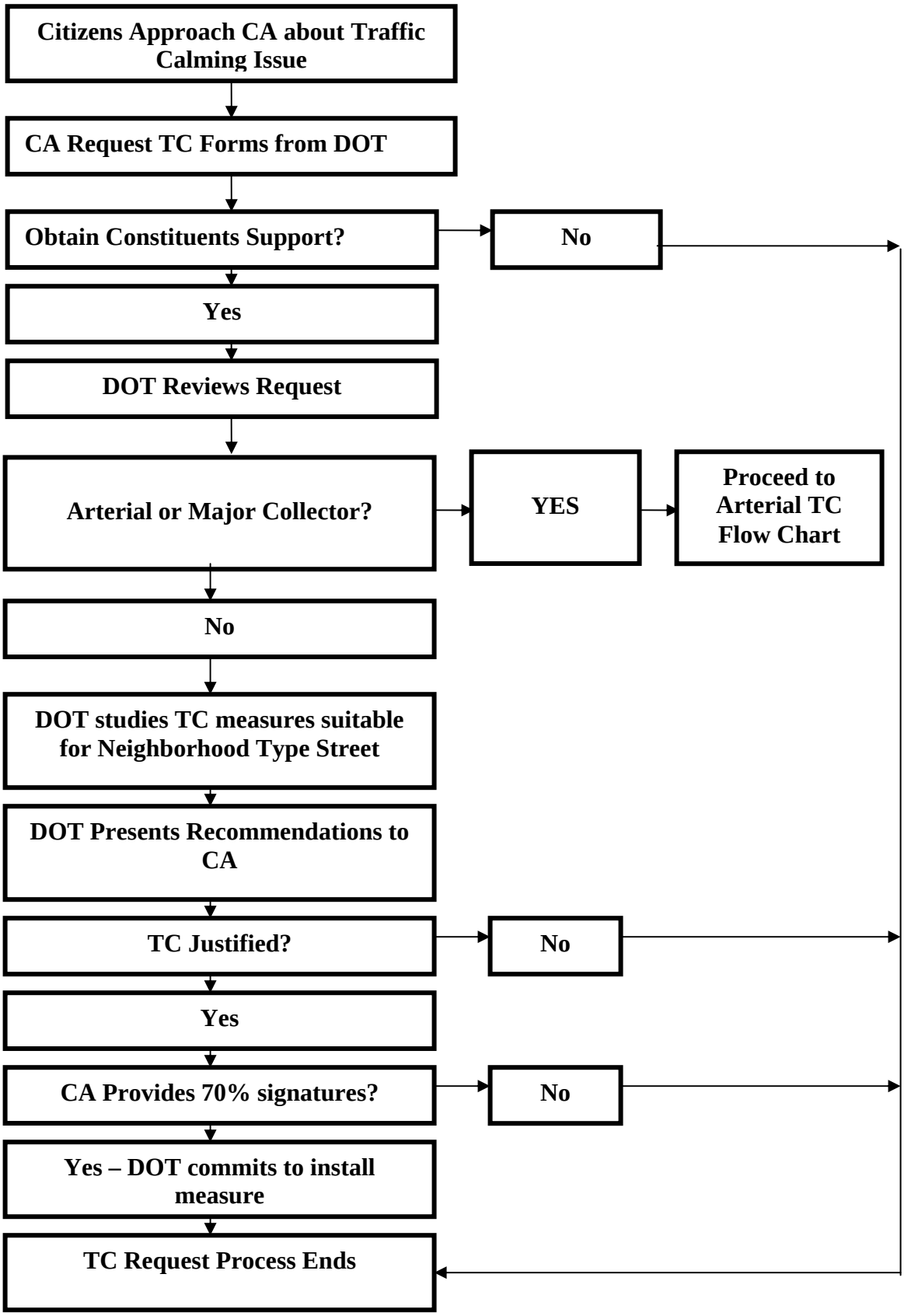


Figure 1. Process flow chart for traffic calming on local residential streets

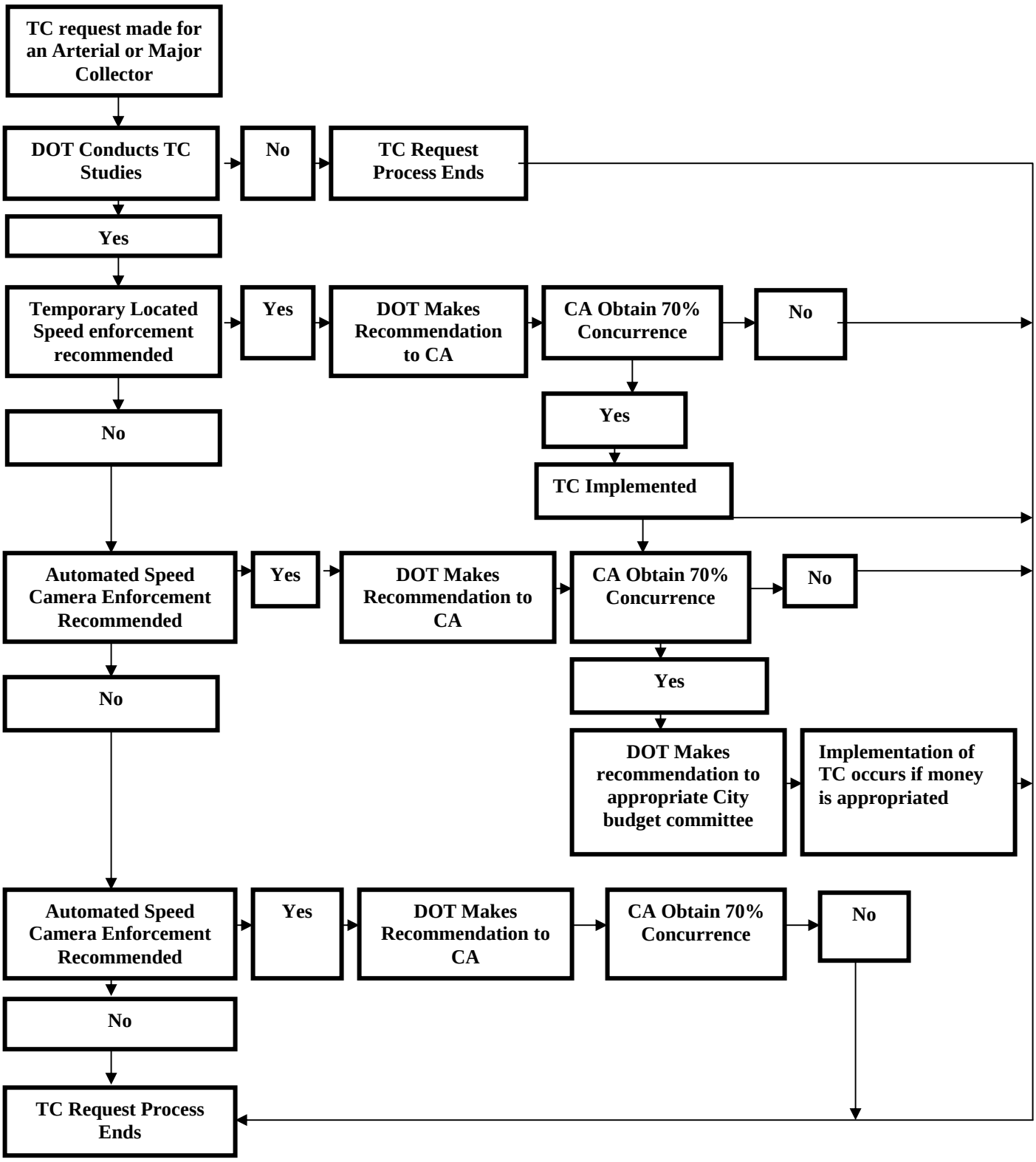


Figure 2. Process flow chart for traffic calming on arterials and major collector streets

(g) Modification or Removal of Traffic Calming Measures

With a broad support of the neighborhood (at least 75% of households), DOT would consider the removal or modification of a traffic calming measure if it fails to meet the intended objective or if it leads to the development of unsafe traffic operations. The removal or modification should also be based on analyses conducted after installation, that is, during the monitoring and evaluation stage. A formal request for the removal of a traffic calming measure(s) should be submitted using the Form on page A-2, Appendix A.

RATING, RANKING AND SELECTION OF PROJECTS

Once a requested street has been categorized by functional roadway classification, the following point system criteria shall be used to determine its point score. The Point System is based on the following criteria (See work sheets in this section): Traffic Volume; Speed; Crashes; School Zone and Playground; Pedestrian Generators; Sidewalk; and Sight Distance.

1. Traffic Volume

Points are assigned according to the street's category and the desirable average weekly daily traffic (AWDT) for that category. The desirable AWDT is based on the road's width, function, and the type of traffic which it should handle, considering the overall local roadway network. Points are assigned according to how much greater (by percentage) the current AWDT volume on the requested street is than the desirable AWDT volume for the road category into which it falls (see the Neighborhood Traffic Management Program Point Assignment Work Sheet in the Appendix for details about the traffic volumes and other criteria). ***20 points maximum score.***

2. Speed

Points are assigned according to how many miles per hour the measured 85th percentile speed on the requested street is over the posted speed limit. The 85th percentile speed indicates that 85 percent of vehicles on a particular street are traveling at this speed or below, as measured by a spot speed study. The 85th percentile speed is a nationally recognized standard. **35** ***points maximum score.***

3. Crashes

Points are assigned based on the street's crash frequency for the three most recent years for which crash data is available. Five points can be accounted for each crash per year for the subject street. A single fatal pedestrian crash will account for the maximum score under this category. Also, each injury related pedestrian accident in a twelve months period will account for 10 points. ***20 points maximum score.***

4. School, Bicycle Trail and/or Playground on the Street

Five (5) points are assigned to a street on which an elementary school or a playground is located. Five (5) additional points may be assigned to a street which

has one or more major pedestrian generators on the street such as libraries, and/or has a bicycle trail. ***10 points maximum score.***

5. Sidewalk

Points are assigned according to how much (by percentage) of the street does not have sidewalk. The points are calculated by multiplying the percentage of the street without sidewalk by 10. For example: 80% (without sidewalk) x 10 = 8 points. If the majority of the street's section(s) without sidewalk has adequate working areas, 5 points are subtracted from the tabulated points. To continue the above example: 8 points – 5 points = 3 points. An adequate walking area is defined as a gravel, paved, or grassy area at least five (5) feet wide and which is unobstructed and reasonably level. ***10 points maximum score.***

6. Limited Sight Distance

Five (5) points are assigned to a street with uncorrectable and extensive sight distance limitations due to conditions such as vertical or horizontal curves, vegetation, or parked vehicles. ***5 points maximum score.***

A P P E N D I X A

TRAFFIC CALMING FORMS

FORM 1

NEIGHBORHOOD TRAFFIC CALMING PROGRAM
POINT ASSIGNMENT WORKSHEET

STREET NAME _____
CLASSIFICATION _____
FROM _____ TO _____
STAFF _____ DATE _____

1) VOLUME (AWDT) _____ _____ POINTS
(MAX. 20 POINTS)

Road Category	**Desirable AWDT**	**Current AWDT**		
		0-25% (10 PTS.)	25-50% (15 PTS.)	>50% (20 PTS.)
Urban-Local/Residential Street	Up to 600 vpd	600-750	751-900	>900
Urban-Collector/Residential Street	2500 vpd	901-1500	1501-2000	>2001

Urban Local/Residential – A 20-foot-wide local access street. Maximum average weekday traffic volume doesn't exceed 2,500 vpd.

Urban Collector/Residential – A 44-foot-wide street, or narrower, which functions as a main access point to a neighborhood or as a through road, but does not directly connect two major roads. Maximum average weekday traffic volume doesn't exceed 5,000 vpd

2) 85TH PERC. SPEED _____ _____ POINTS
POSTED SPEED LIMIT _____ (MAX. 35 POINTS)

MPH OVER POSTED SPEED LIMIT

< 6	6-10 MPH	11-15 MPH	>15 MPH
0	15 PTS.	25 PTS.	35 PTS.

3) FATAL PEDESTRIAN CRASHES_____ POINTS
(20 Points if yes)

NUMBER OF INJURY PEDESTRIAN CRASHES_____ POINTS
(5 Points per crash)

4) SCHOOL OR PLAYGROUND ON ROADWAY _____POINTS
(YES = 5 POINTS)

MAJOR PEDESTRIAN GENERATORS _____ POINTS
(YES = 5 POINTS)
(Libraries, Shopping Centers and parks on subject road)

5) SIDEWALK _____ POINTS
(MAX. 10 POINTS)

(% of roadway without sidewalk on at least one side multiplied by 10. Example: 80% x 10 = 8 pts.); subtract 5 points if majority of the road without sidewalk has an adequate walking area.)

Adequate walking area: A gravel, paved, or grassy area at least 5 feet wide and which is unobstructed and level.

6) LIMITED SIGHT DISTANCE _____ POINTS
(YES = 5 POINTS)

(Uncorrectable and extensive sight distance conditions due to vertical or horizontal curves, vegetation, parked vehicles, etc.)

POINTS
SHEET 1: _____ POINTS
SHEET 2: _____ POINTS

TOTAL: _____ POINTS

RECOMMENDED TRAFFIC CALMING TREATMENT:

_____

_____

_____

_____

CITY OF BALTIMORE
DEPARTMENT OF TRANSPORTATION
TRAFFIC DIVISION

417 E. Fayette Street
Baltimore, MD 21201

FORM 2: REQUEST FOR TRAFFIC CALMING STUDY

INTRODUCTION

The following is a request for a traffic calming study. The request will be processed according to procedures in the *City of Baltimore Traffic Calming Policies and Guidelines*. Please complete both Part A and Part B.

A. STREET INFORMATION

Please provide the name(s) of the street(s) on which a study is requested as well as the boundaries of the street segment. (Note: Boundaries may change at DOT's discretion).

Requested Street: _____
From: _____
To: _____

Describe Problem(s): _----------

B. CONTACT PERSON INFORMATION

Each request must provide a contact person who lives on the (or one of the) requested street segments or is a COMMUNITY ASSOCIATION representative. The contact person will receive all relevant correspondence and be responsible for gathering evidence of support when requested.

Name of Representative: _____

Community Association: _____

Address: _____

Zip Code: _____ Telephone Number:_____

I agree to be the contact person for the above request

Signature: _____ Date: _____

Evidence of support attached? Yes No

Does the COMMUNITY ASSOCIATION concur with this application? Yes No

CITY OF BALTIMORE
DEPARTMENT OF TRANSPORTATION
TRAFFIC DIVISION

417 E. Fayette Street
Baltimore, MD 21201

FORM 3: REQUEST FOR REMOVAL OF A TRAFFIC CALMING MEASURE

INTRODUCTION

The following is a request for the removal of a traffic calming measure(s). The request will be processed according to procedures in the *City of Baltimore Traffic Calming Policies and Guidelines*. Please complete both Part A and Part B.

A. STREET INFORMATION

Please provide the name(s) of the street(s) on which the traffic calming measure is located.

Street Name(s):_____
From: _____
To: _____
Description/Type of Measure:_____

B. CONTACT PERSON INFORMATION

Each request must provide a contact person who lives on the (or one of the) requested street segments within the study area boundary or is a COMMUNITY ASSOCIATION representative. The contact person will receive all relevant correspondence and be responsible for gathering evidence of support when requested.

Name of Representative: _____

Community Association: _____

Address: _____

Zip Code: _____ Telephone Number:_____

I agree to be the contact person for the above request

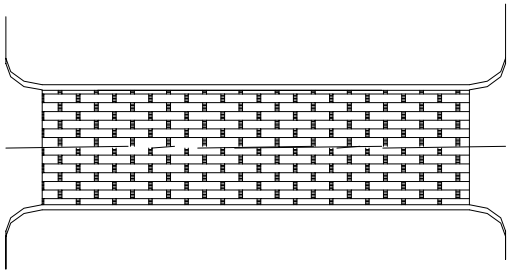
Signature: _____ Date: _____

Evidence of support attached? Yes No

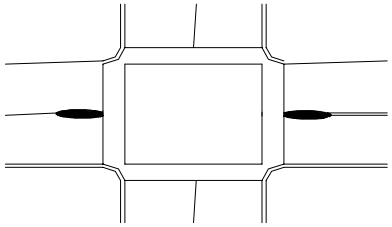
Does the COMMUNITY ASSOCIATION concur with this application? Yes No

A P P E N D I X B

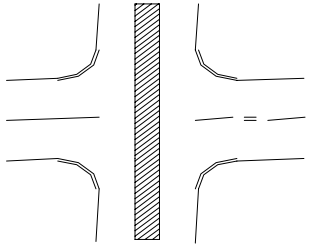
TRAFFIC CALMING SCHEMATICS



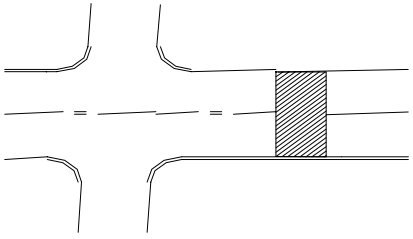
Textured Pavement



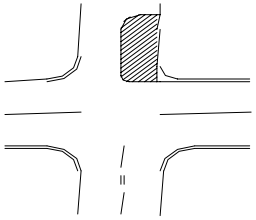
Pedestrian Refuges



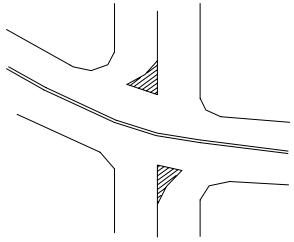
Median Barrier



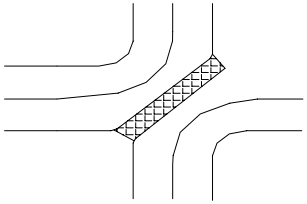
Full Closure



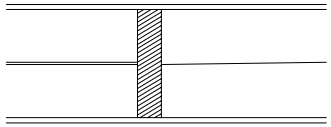
Half Closure



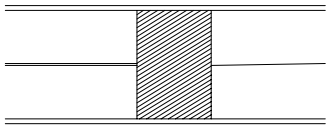
Forced Turn Island



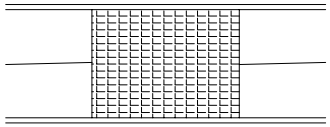
Diagonal Diverter



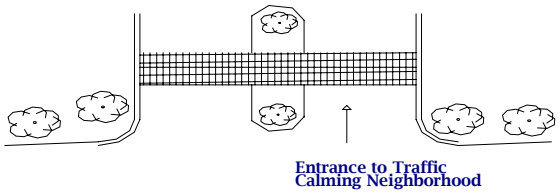
Speed Bump



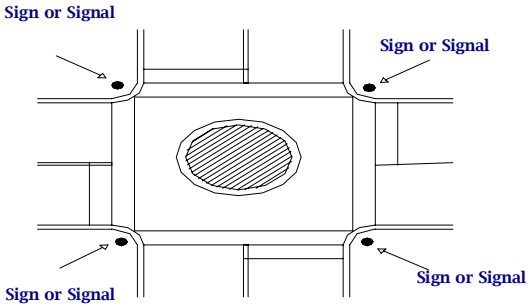
Speed Hump



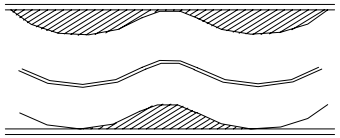
Speed Table



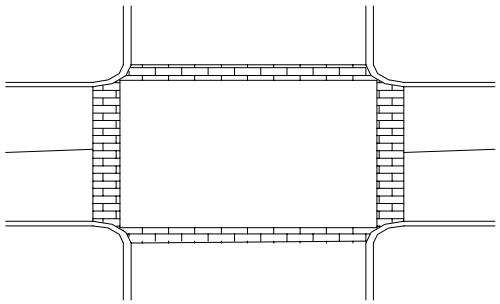
Gateway



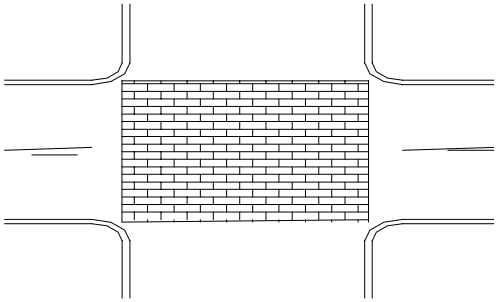
Traffic Circle



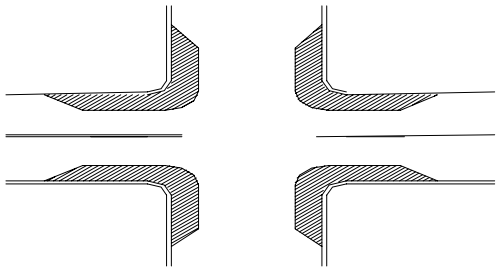
Chicane



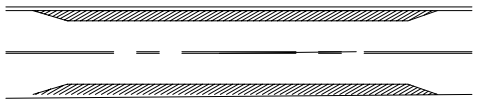
Raised Cross Walk



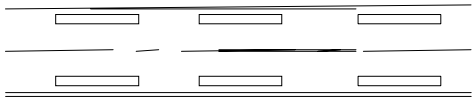
Raised Intersection



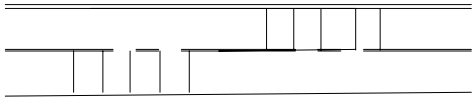
Kneckdowns



Chokers



On - Street Parking



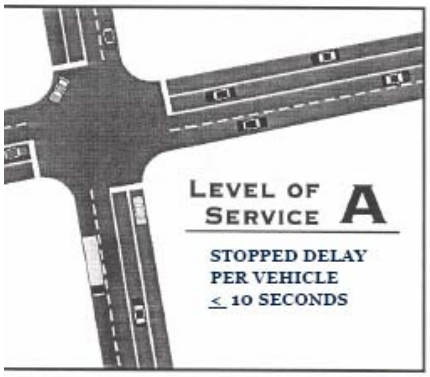
Rumble Strips

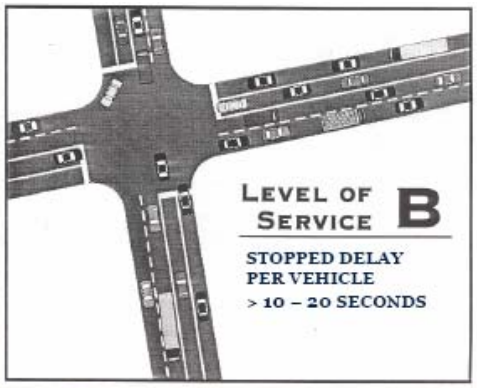
A P P E N D I X C

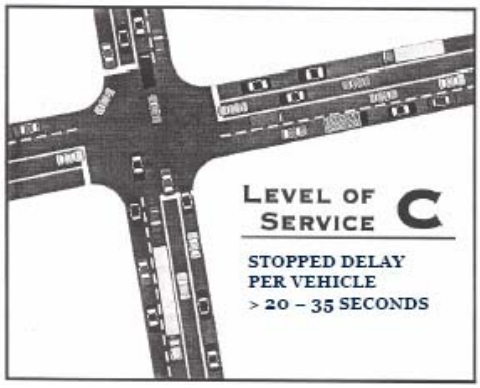
LEVEL OF SERVICES ILLUSTRATIONS

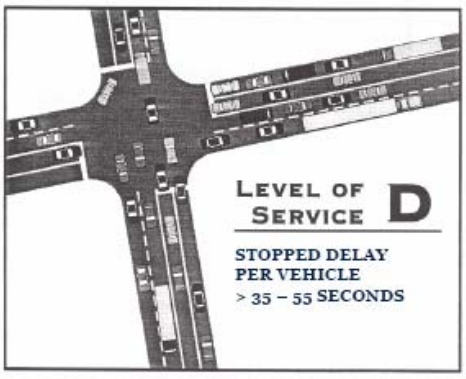
- Intersections
- Arterials

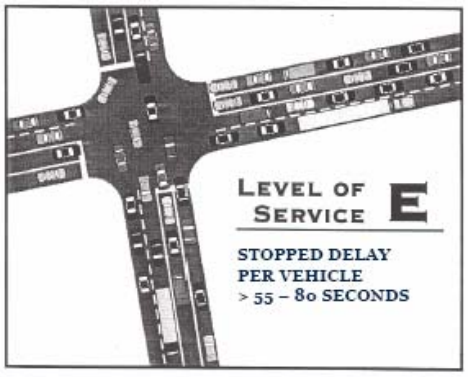
Intersection Level of Services Illustrations

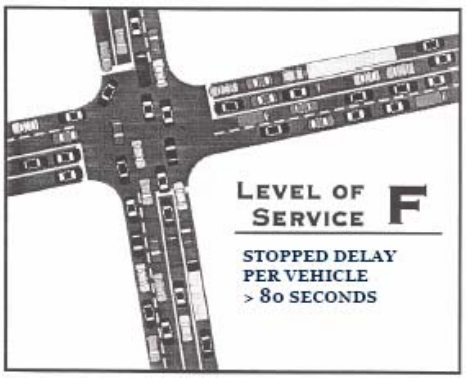












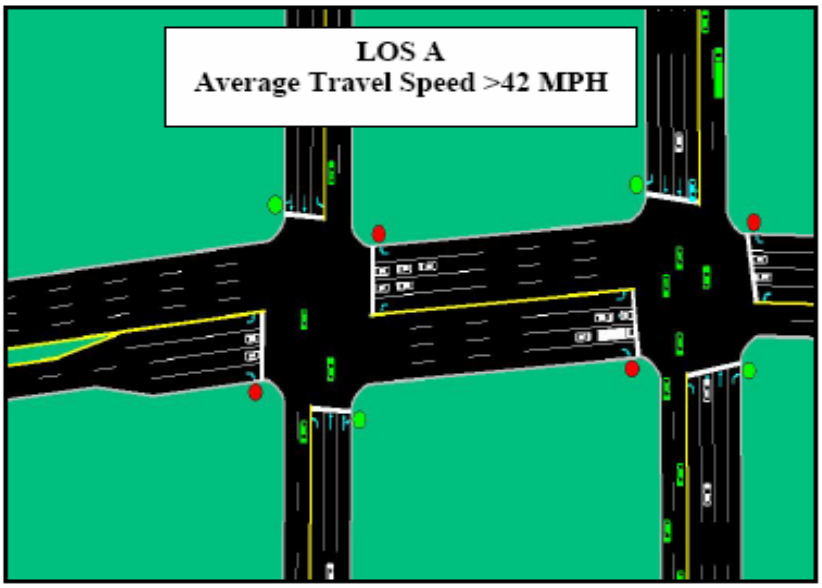
ARTERIAL LEVEL OF SERVICE

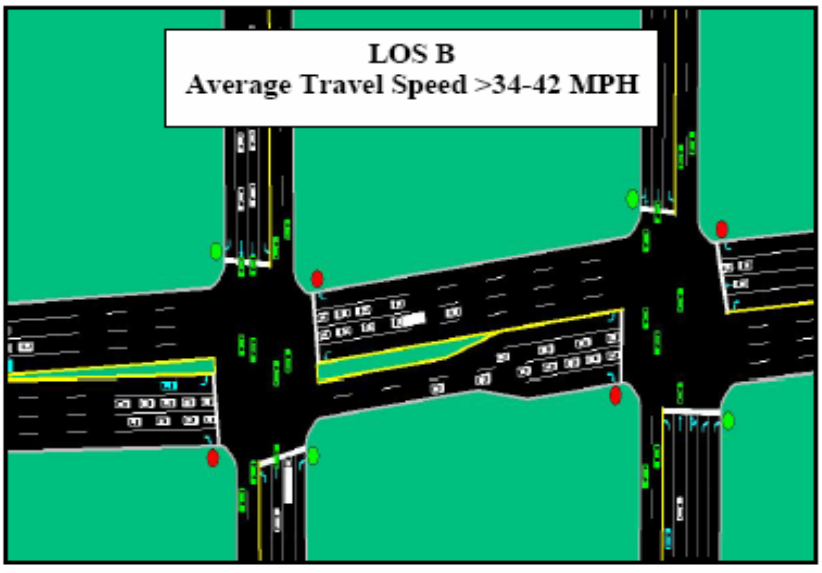
		# OF THROUGH LANES		
		1 LANE	2 LANES	3 LANES
LOS A	*(>42 MPH)*	N/A	N/A	N/A
LOS B	*(>34 – 42 MPH)*	130	200	N/A
LOS C	*(>27 – 34 MPH)*	350	860	1230
LOS D	*(>21 – 27 MPH)*	530	1090	1510
LOS E	*(>16 – 21 MPH)*	590	1220	1680
LOS F	*(≤16 MPH)*			

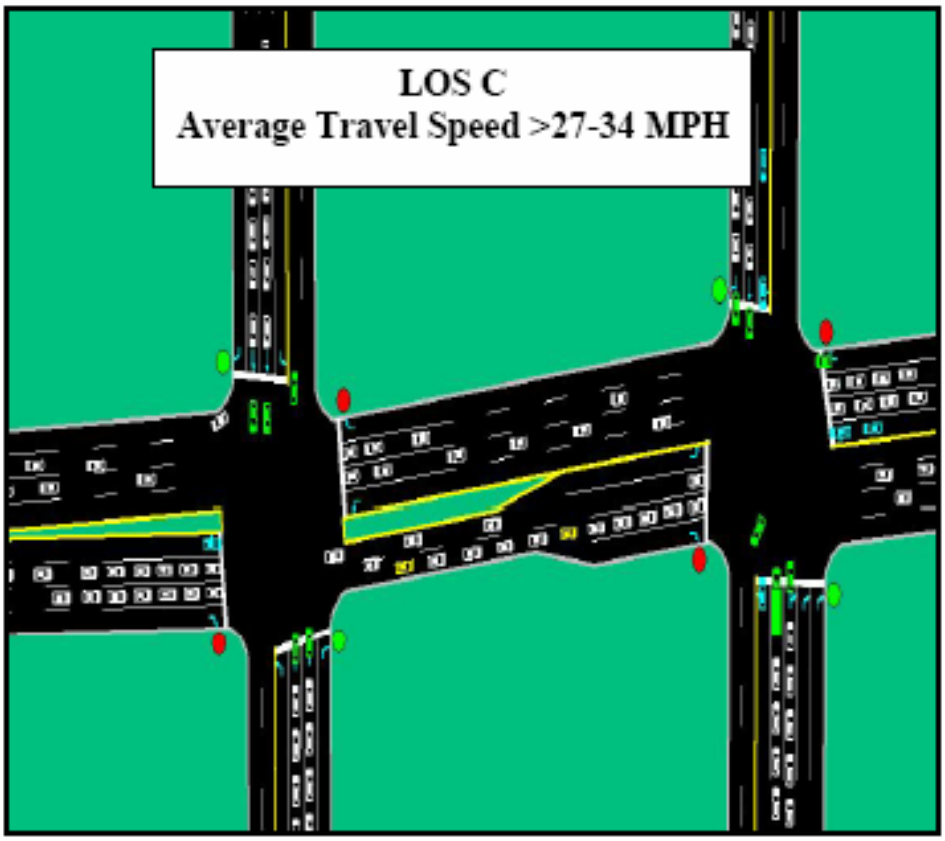
SPEED (MPH): 42, 34, 27, 21, 16, 0

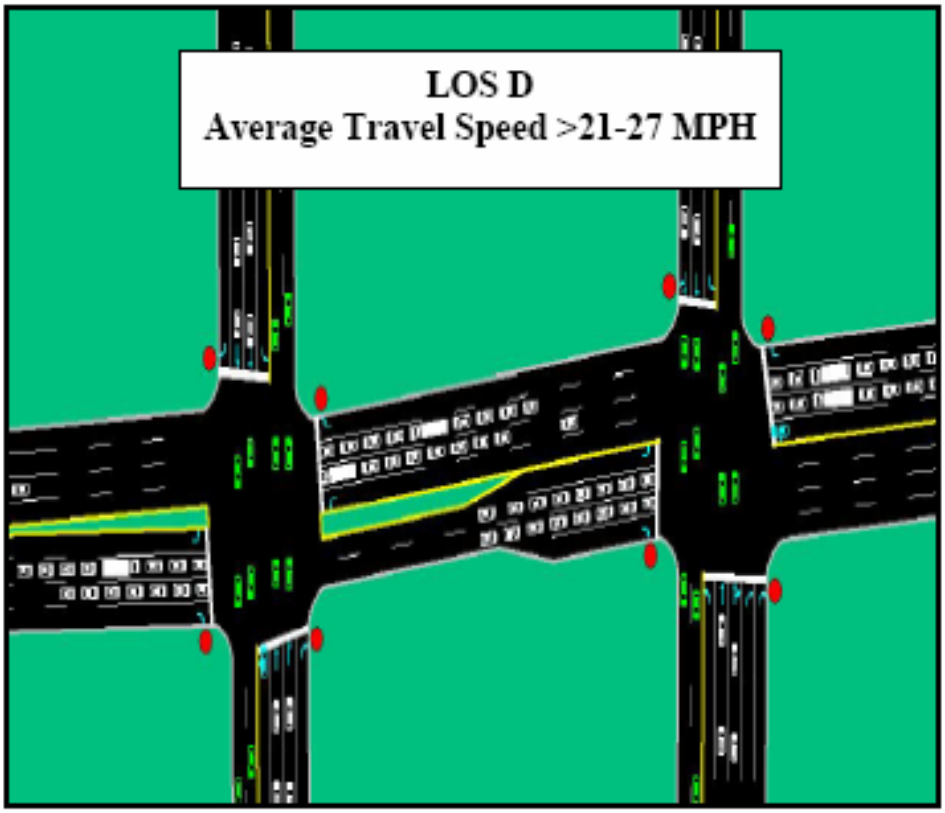
SERVICE VOLUMES (Vehicles/hour)

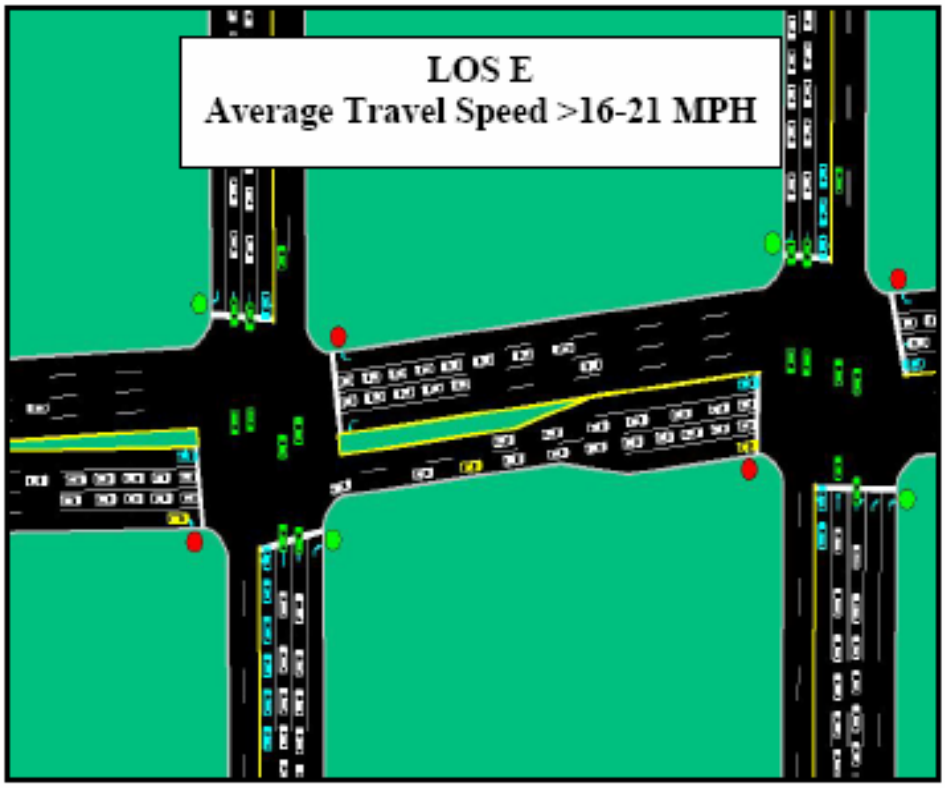
ARTERIAL LEVEL OF SERVICE ILLUSTRATIONS

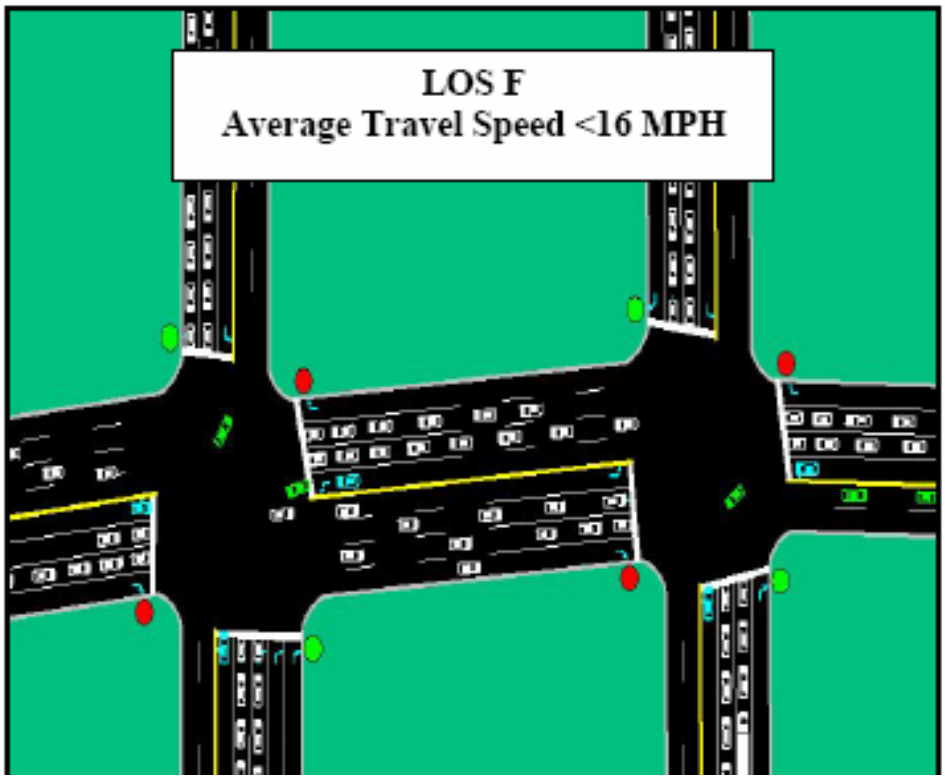





LOS C
Average Travel Speed >27-34 MPH


LOS D
Average Travel Speed >21-27 MPH


LOS E
Average Travel Speed >16-21 MPH


LOS F
Average Travel Speed <16 MPH